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TOWNSHIP OF JAFFRAY-MELICK

A SURVEY OF THE WATER SUPPLY AND SEWAGE DISPOSAL CONDITIONS



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March, 1976

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Ministry
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L. F. Pitura
Director
Northwestern Region

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A SURVEY OF THE WATER SUPPLY AND SEWAGE DISPOSAL CONDITIONS

Municipal & Private Abatement Section
Kenora District Office
March, 1976

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TOWNSHIP OF JAFFRAY-MELICK
A SURVEY OF THE WATER SUPPLY AND SEWAGE DISPOSAL CONDITIONS

INTRODUCTION

The purpose of this report is to summarize the results of the survey which was conducted in the summer of 1975, in the Township of Jaffray-Melick. In addition, this report proposes to summarize the bacteriological results of samples collected by the Northwestern Health Unit from public bathing areas and privately owned water works systems in this Township.

From the information obtained from the survey, the conditions of the groundwater affecting the potable water supply and the effects of private sewage disposal on the water supply and the watercourses in the area, can be determined. This report proposes to utilize this information for the following objectives:

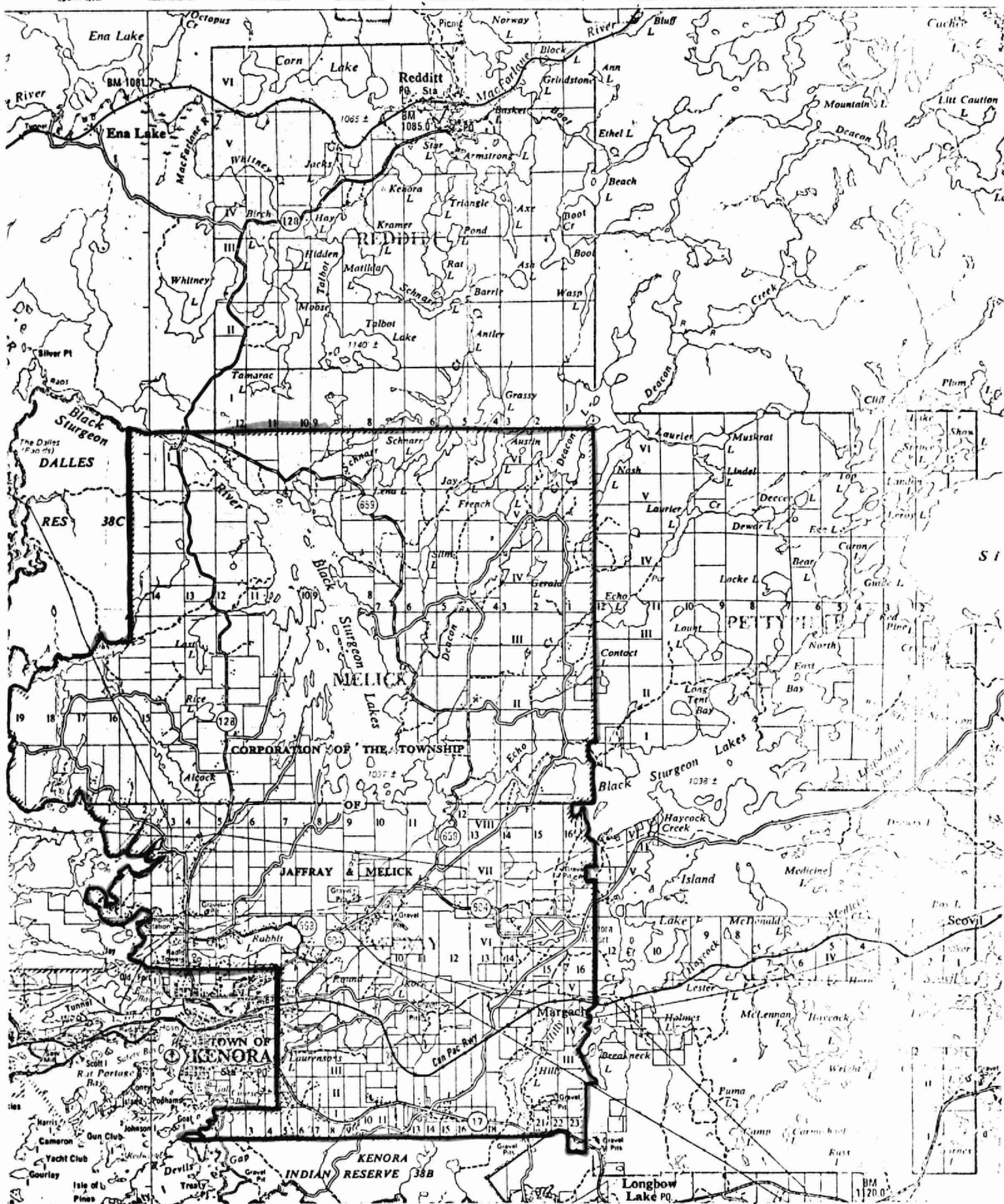
1. To ensure all concerned parties are aware of existing ground and surface water conditions
2. To establish if there is a definite need for extending existing Town of Kenora water and sewage facilities to service this area.

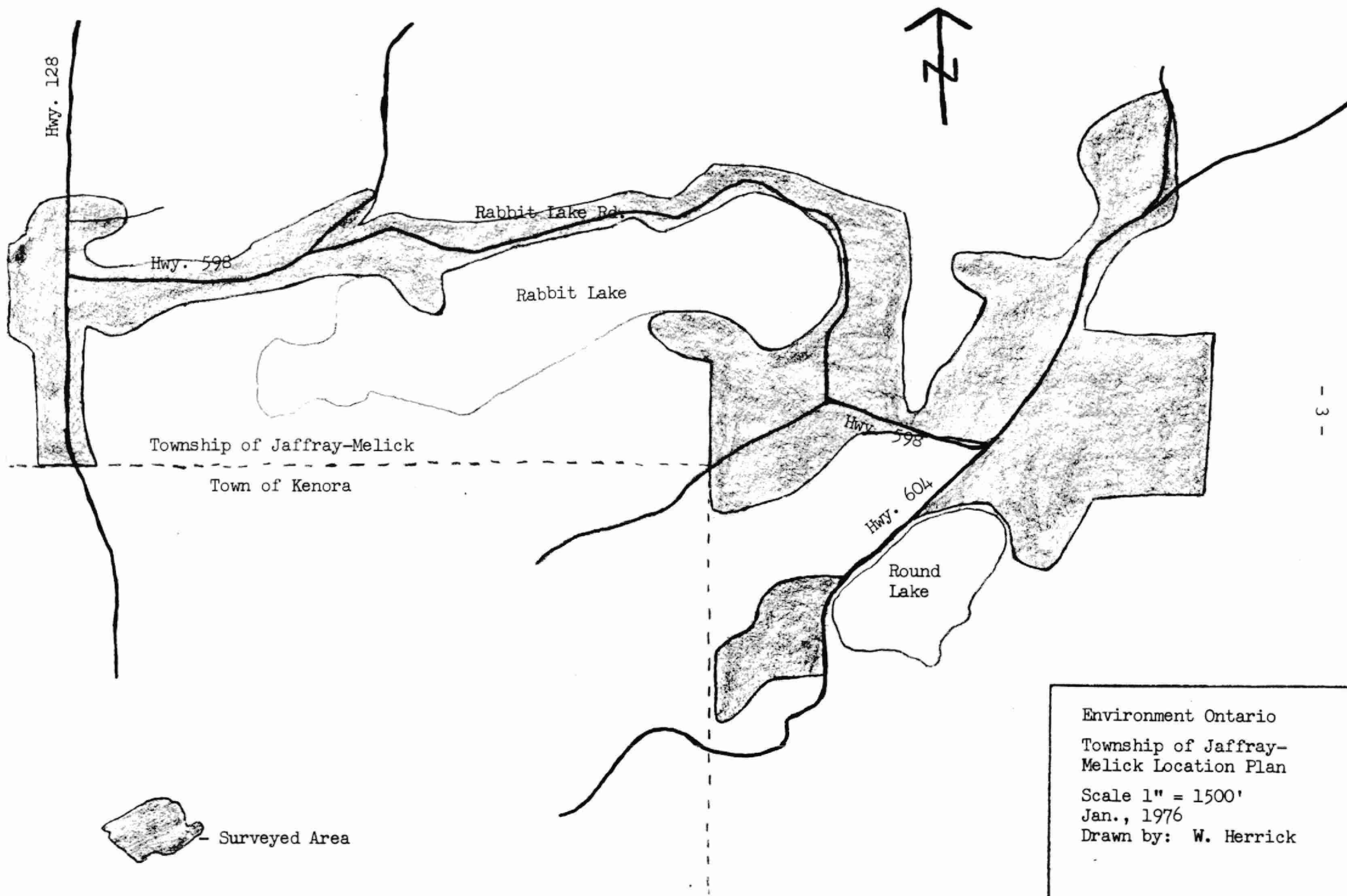
The assistance and information obtained from the following organizations and individuals during the gathering of data for this report is gratefully acknowledged:

- a) Kenora Public Health Laboratory
- b) Northwestern Health Unit
- c) Proctor and Redfern, Limited
- d) Mr. W. Stewart, Engineer, Town of Kenora
- e) Mr. Kevin Johnson, University Student

30'

20'





Environment Ontario
Township of Jaffray-Melick Location Plan
Scale 1" = 1500'
Jan., 1976
Drawn by: W. Herrick

LOCATION AND DESCRIPTION

The survey was confined to the densely populated sections of Jaffray-Melick which includes the areas immediately to the north and east of Town of Kenora boundaries. The following were included in the study area:

- a) Along highway 604 from its intersection with highway 598 to the intersection with Tetroe Road
- b) North of highway 598 between highway 128 and highway 604 to the Trans-Canada Pipeline right-of-way
- c) Along highway 128 from Kenora town limits north to the Trans-Canada Pipeline Pumping Stations
- d) Immediately east of the Kenora town boundary and west of Round Lake, north of the CPR tracks

The study area is illustrated by the shaded portion on the preceding map.

This area is governed by the Township of Jaffray-Melick council. There are no industries that use significant quantities of water located in this locality.

TOPOGRAPHY

The topography can best be described as rocky, rolling terrain, typical of the Pre-Cambrian Shield. The soil cover varies from non-existent to just several inches along highway 128 to substantial depths of primarily sandy soil in the more eastern sections of the study area.

The majority of the natural drainage is to either Rabbit or Round Lake. Rabbit Lake is drained from its western end by a creek, which flows through a portion of the study area to reach the Winnipeg River. Round Lake is drained from its most southerly tip by a creek which connects with Laurensens Creek which in turn flows into Lake of the Woods.

POPULATION

The adjacent communities of Kenora and Keewatin, more or less combine with Jaffray-Melick to form one socio-economic unit. As this unit area grows, it is anticipated that by far, the largest population increase will occur in Jaffray-Melick. This is due to the fact that both Kenora and Keewatin are severely restricted by both manmade and geological boundaries, which greatly restrict the amount of developable land.

In the 451 acres, which comprise the study area, the population was 1200 in 1975. In a study completed by Proctor and Redfern Limited in 1975 for the Ministry of the Environment, they predicted that the population would increase in this same area to 4000 by 1996. This is based on the assumption that water and sewage facilities will be extended from the present Kenora water and sewage systems to service this area. This appears very realistic, as in the past major subdivisions to the east of highway 604, have not really materialized because of a lack of water and sewage services.

PRIVATE WATER SUPPLIES SURVEY

INTRODUCTION

An attempt was made throughout the summer of 1975 to secure a bacteriological sample from each private water supply in the study area. In addition, chemical samples were collected at random from a statistically representative number of wells and were analyzed for hardness, alkalinity, iron, pH, total kjeldahl nitrogen, total phosphorus and sulphate. A general questionnaire relating to the individual method of water supply and waste disposal was also filled out at that time.

The bacteriological samples collected were analyzed at the Ministry of Health Laboratory in Kenora, while the chemical samples were shipped by bus to the Ministry of the Environment Laboratory in Thunder Bay. All analyses were conducted according to "Standard Methods".

DISCUSSION OF BACTERIOLOGICAL RESULTS

The bacteriological samples taken were tested for two specific groups of bacteria, which are generally used as indicators of pollution; namely, total and faecal coliforms. Total coliforms consist of both bacteria species from animal and faecal matter and those, which are normal inhabitants of soil and vegetation. Faecal coliforms are species that are associated primarily with human and animal faecal matter. As faecal coliforms die off very quickly once outside the intestines of warm blooded animals, then high counts of these types of bacteria are good indicators of recent pollution inputs.

The following is an acceptable means of classifying the quality of water for domestic use and has been used throughout this study:

1. Satisfactory for human consumption if both total and faecal coliforms are absent
2. Doubtful if the total coliforms are less than or equal to four organisms and faecal coliforms are absent, and
3. Unsatisfactory if the total coliforms are greater than four and/or faecal coliforms are present

Although there can be other explanations, a doubtful sample can indicate that a pathway for pollution exists and more dangerous pollution could occur when conditions change. These conditions could include heavier pollution at the source, heavier rainfall or runoff and high groundwater levels. An unsatisfactory

TABLE ONE

SUMMATION OF PRIVATE WELL SURVEY
TOWNSHIP OF JAFFRAY-MELICK

<u>CATEGORY</u>	<u>NUMBER</u>	<u>% OF TOTAL VISITED</u>
Total Residences Visited	243	—
No Answer	97	39.9
Residences Inspected	146	60.1
<u>TYPE OF WATER SUPPLY OF RESIDENCES INSPECTED</u>	<u>NUMBER</u>	<u>% OF TOTAL INSPECTED</u>
Wells	81	55.4
Lake	19	13.0
Water Imported	23	15.8
Well Water but Imported Part of the Year	16	11.0
Unknown	7	4.8
<u>LAB RESULTS OF WELL AND LAKE SUPPLIES TESTED</u>	<u>NUMBER</u>	<u>% OF WATER SUPPLIES TESTED</u>
Satisfactory	52	55.9
Doubtful	6	6.5
Unsatisfactory	35	37.6
<u>INDIVIDUAL METHOD OF WASTE DISPOSAL</u>	<u>NUMBER</u>	<u>% OF TOTAL INSPECTED</u>
Septic Tank and Tile Field	123	84.2
Privy	11	7.5
Holding Tank	7	4.8
Direct Discharge	3	2.1
Other	2	1.4

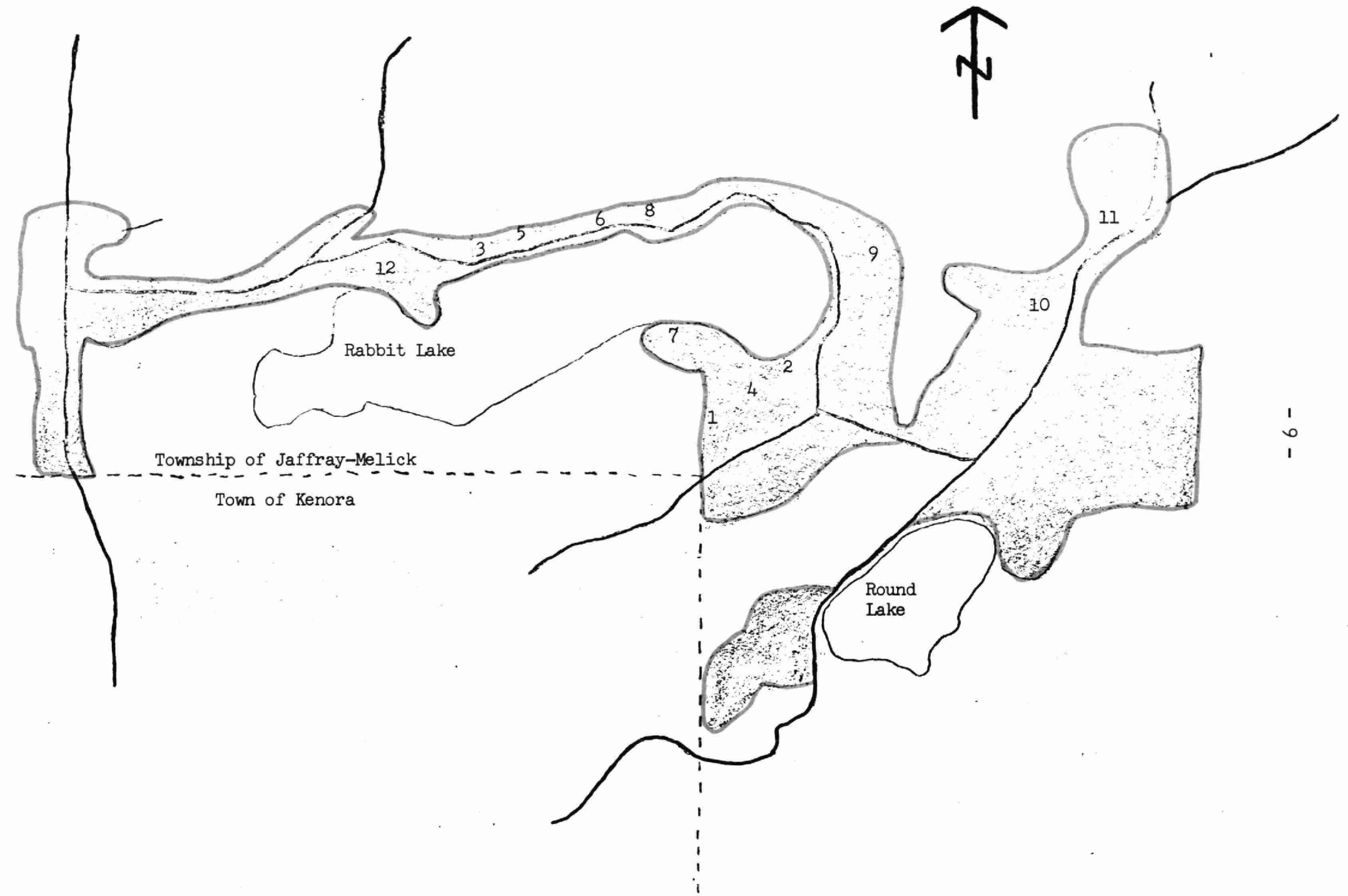
TABLE TWO

CHEMICAL RESULTS OF SAMPLES COLLECTED FROM PRIVATE WELLS
TOWNSHIP OF JAFFRAY-MELICK

Sample Location	Hardness As CaCO ₃	Alkalinity As CaCO ₃	Iron As Fe	Chloride As Cl	PH At Lab	Total Kjeldahl As N	Phosphorus As P Total	Sulphates As SO ₄	Source of Supply	Bacteriological Results
1.	48	48	.05	2	5.9	.29	.010	14	Drilled Well	Satisfactory
2.	40	35	.25	17	7.0	.48	.013	5	Lake	Satisfactory
3.	89	75	3.2	20	6.2	.63	.015	15	Drilled Well	Unsatisfactory
4.	6	0	23.0	5	4.5	.79	.009	11	Drilled Well	Satisfactory
5.	22	13	.65	5	5.2	.20	.004	6	Drilled Well	Satisfactory
6.	40	35	.10	16	6.8	.41	.016	5	Lake	Satisfactory
7.	28	4	.05	9	7.0	.50	.009	15	Lake	Satisfactory
8.	32	24	.05	4	5.5	.25	.009	7	Drilled Well	Satisfactory
9.	240	218	1.4	11	6.8	.44	.010	9	Drilled Well	Unsatisfactory
10.	72	54	2.0	45	5.5	3.6	.015	29	Dug Well	Satisfactory
11.	140	116	4.1	43	6.2	1.5	.006	18	Drilled Well	Satisfactory
12.	80	88	1.0	89	5.8	.88	.042	13	Drilled Well	Satisfactory

Note: 1. All analyses except pH in ppm,
2. Sample locations illustrated on following map.

WATER SUPPLY SYSTEMS CHEMICAL SAMPLING LOCATIONS



sample signifies a pollution problem and can be regarded as being severe enough to render the water potentially dangerous to the user's health and should not be consumed unless properly treated.

Every resident whose water system had a doubtful or unsatisfactory coliform count was advised in writing of the laboratory result. It was strongly recommended that they resample their system and consult the Northwestern Health Unit regarding treatment procedures. The Health Unit was also informed of all adverse counts.

The bacteriological results for the private water systems sampled are summarized in Table One. Appendix One contains the form letter sent to residents where adverse bacteriological samples were collected.

DISCUSSION OF CHEMICAL RESULTS

Samples for chemical analyses were randomly collected from twelve private water systems in the study area. Of the twelve systems, three consisted of water pumped from Rabbit Lake, one was a dug well and the remainder were drilled wells. The samples were shipped by bus to Thunder Bay and were analyzed at the Ministry of the Environment Laboratory.

The constituents analyzed were those commonly found in groundwater in quantities sufficient to have any practical effect upon the value of the water for domestic use. The results are shown in Table Two.

HARDNESS (CaCO_3) - Is attributable principally to calcium and magnesium and gives an indication of the amount of soap that first must be used to precipitate the above compounds before a lather is produced. In the absence of industrial wastes, hardness is usually caused by the natural accumulation of salts

from contact with soil and geological formation. The fact that the majority of the wells in the area are located in granite rock formation accounts for the low hardness values in the area.

The major detrimental effect of hardness is economical as it results in excessive soap consumption and formation of scum and scales. Only two systems show levels of hardness where these detrimental factors are significant.

ALKALINITY (CaCO_3) - Is a measure of the water's capacity to neutralize acid. Due to the lack of limestone or other calcium type deposits, which are usually correlated with high alkalinity, the values for this parameter are on the whole, low for this area. The only exceptions are the two wells with high hardness reading, suggesting that these wells are utilizing a different aquifer.

Alkalinity is not a polluting substance or considered to be harmful to humans, but it is associated with high pH values, hardness and excessive dissolved solids, all of which can be deleterious. Extremely low values as are experienced in several of the sampled wells, results in low pH and this in turn, results in elevated iron concentrations.

IRON (Fe) - When low pH's are experienced, high concentrations of iron can often be found in groundwater supplies. This is not the case in natural surface waters as the ferrous irons readily oxidize with the dissolved oxygen to form insoluble compounds, which coagulate and settle out.

The Ministry of the Environment recommends a limit of 0.3 ppm on aesthetic and taste considerations rather than physiological reasons. Iron causes extensive staining to laundry and porcelain fixtures. Also, high iron contents can cause excessive growth of certain types of bacteria. The majority of the wells sampled were significantly above the recommended level. All of the lake source supplies tested, were low in iron concentrations due to the previous mentioned oxidation effect.

CHLORIDE (Cl) - Was included in the survey because it may be derived from human sewage in addition to the natural mineral origin. Chlorides in water are generally not harmful to humans and restrictions on the concentrations are based on palatability requirements rather than health. The Ministry of the Environment recommends that for a water supply, the chloride concentration not exceed 250 ppm. None of the systems approached this concentration, however, three of the wells were significantly higher than the average of the systems sampled. This could suggest interferences from an external source.

TOTAL KJELDAHL (N) - Is a measure of the organically bound nitrogen in the water. A rise in the organic nitrogen content may often be related to sewage entering a water supply. High concentrations generally indicate the presence of nitrogen for biological utilization. Five of the nine wells sampled show elevated levels and confirm that these sources had more moderate, but still relatively high concentrations.

TOTAL PHOSPHORUS (P) - Is a measure of both the organic and inorganic forms of phosphorus. High concentrations can often be correlated with past introduction of domestic wastes. At least half of the systems have phosphate concentrations which could promote aquatic productivity.

SULPHATES (SO₄) - Occur in natural water as a result of leaching from gypsum or other common minerals. The Ministry of the Environment has established a recommended limit of 250 ppm mainly because of the laxative action at this concentration. This limit was not approached in any of the systems sampled.

pH - Is an index of the acidity or alkalinity of the water as represented by the instantaneous hydrogen ion concentration. pH affects taste, corrosivity and efficiency of chlorination. The Ministry of the Environment recommends a pH range of 6.0-8.5 units.

Five of the nine wells tested had pH's more acidic than 6.0. At these acidic conditions, corrosion will be a definite concern.

In conclusion, of the nine wells tested, although only two had unsatisfactory bacteriological results, none of them had chemical values, which are considered acceptable for domestic use by the Ministry of the Environment standards. The general trends of the wells sampled are extreme high iron content, low alkalinity, low pH and high nutrient concentrations. The only exceptions are two wells, which have both high hardness and alkalinity values, which strongly suggest that they are utilizing completely different aquifers.

On the whole, the Lake sources sampled, show less extreme chemical conditions due to the self-purification processes of natural bodies of water. However, all surface supplies, as will be illustrated in a later section of this report, are more apt to have unsatisfactory bacteriological conditions, as they are continually being affected by external sources of human and animal pollution.

SEWAGE DISPOSAL

As can be seen from Table One, the greatest majority of residences have septic tanks - tile field systems installed. Over the course of the survey, many problems were observed in conjunction with old septic tank - tile field systems. These can be traced to three factors:

1. Installation prior to Health Unit supervision and therefore improper construction.
2. Destruction of part of the tilefield
3. Inadequate size to handle increased modern day waste volumes.

Many of the older systems were observed to be too close to wells and/or watercourses. Often, in these cases, the problems were due to the fact that the lots were too small, therefore, adequate sized systems could not be built and still maintain the proper distances so as not to pollute these water systems.

Also in many of the older systems surfacing or ponding of effluent was observed. This is usually an indication of small or partially destroyed tile fields. This situation is a serious health hazard (i.e., fly and insect breeding sites and increased vermin populations), and can cause contamination of wells or watercourse particularly after heavy rainfalls.

The high percentages of privies and holding tanks (Table One), is a direct result of lack of adequate soil cover for tile field systems, particularly in the northwest section of the study area. In some sections, all of the required fill for the tile field would have to be imported thereby, greatly increasing the installation cost.

SUMMARY OF GROUNDWATER CONDITIONS

On reviewing the data and facts to date on the groundwater conditions, the following conclusions were reached:

a) Approximately 60% of all the residences in the study area were contacted during the survey and 93 of these had water supplies, which were sampled for bacteriological analyses. Approximately thirty-eight percent of the systems were found to be unsatisfactory for human consumption and six percent were doubtful.

b) Thirteen percent of the residences inspected were utilizing lake water as their sole source of water. In the majority of cases, this water was being consumed with no prior treatment.

As well, sixteen percent of residences had no supply of water on the property and have been forced to import drinking water from outside sources (usually Kenora water supply), where water is palatable and safe. An additional eleven percent have wells but have to import water at least part of the year either because of inadequate supply or because of surface contamination.

c) The chemical results show that the groundwater supplies are exceedingly high in iron and are often very acidic. They also suggest that the groundwater is being affected by leachate from individual sub-surface sewage disposal systems.

d) The presence of too many outdated septic tank-tile field systems, which are malfunctioning or are located in close proximity to wells is having an adverse effect on the groundwater quality.

It is concluded that the property owners are being forced to other sources of water rather than the groundwater supply in the area, due to bacteriological and/or chemical quality problems, which render the water unsuitable for consumption. This situation is not localized in specific areas as adverse samples and conditions were obtained and observed through the community. The only exception is the western section of the study area where the problems are intensified by the lack of adequate soil cover.

SERVICED AREA

Part of the study area is presently connected to the Kenora water distribution system. Included in the serviced area are the following: Kilpatrick Ave., Peter St., Mary Lou St., Doner Ave., Anne St., Florence St., Highway 598 from the Kenora town limits to Highway 604 and Rabbit Lake Road from the south junction to just north of Birchwood Crescent. Connected to this system are 70 residences, 3 schools and 4 commercial establishments.

This area was not included in the survey for the following reasons:

1. Sewage waste disposal problems are not anticipated in this section, and;
2. The residences are receiving an adequately treated water supply.

In most of this area, there is an adequate depth of sandy type soil so that proper septic tank - tile field systems can be utilized. One exception of this is the section to the north-east of the Rabbit Lake Drive-In. Previously, this section was a swamp. The area was drained and the water diverted northwards. In this section, it is necessary to import proper fill for tile fields.

In addition, most of the houses in this area, are relatively new and are built on sufficiently large lots. The majority of the sewage systems have been installed with the Northwestern Health Unit approval and there are no related problems recorded in this area.

TREATED PUBLIC WATER SUPPLY SYSTEMS

INTRODUCTION

There are two private communal water supply systems in the study area; namely at the Rabbit Lake Trailer Park and at the Rabbit Lake Public School. Both of these water systems obtain their water from Rabbit Lake with their intake pipes in the same vicinity of the lake as the Rabbit Lake beach. The trailer park inlet is about 400 feet north of the bathing area and the school's inlet is approximately 1200 feet northwest of this area.

In the past, the Northwestern Health Unit has been collecting bacteriological samples on a periodic basis from both of these systems. The results are summarized in Table Three, from 1971 to the present.

RABBIT LAKE SCHOOL

One hundred and eight students and ten adults are affected by this system.

The school's water system is chlorinated with a javex solution. The school's janitor tests the chlorine residuals on a periodic basis and ensures that the residual remains above 0.5 mg/l by adjusting the chlorinator or the concentration of the javex solution. Table Three (a) shows that in the last five years, only one adverse bacteriological sample has been collected from the school.

The school utilizes a septic tank-tile field system for its sewage disposal. Reportedly, the system has backed up on numerous occasions in the past. This strongly suggests that the system is not large enough to handle the organic and hydraulic loading from the school population.

TABLE THREE (a)

BACTERIOLOGICAL RESULTS COLLECTED BY NORTHWESTERN
HEALTH UNIT FROM RABBIT LAKE SCHOOL WATER SUPPLY

<u>YEAR</u>	<u>SATISFACTORY</u>	<u>DOUBTFUL</u>	<u>UNSATISFACTORY</u>
1971	21	0	0
1972	9	0	0
1973	2	0	0
1974	13	0	1
1975	3	0	0
TOTAL	48	0	1
PERCENT	98%	0	2%

TABLE THREE (b)

BACTERIOLOGICAL RESULTS COLLECTED BY NORTHWESTERN
HEALTH UNIT FROM RABBIT LAKE TRAILER PARK WATER
SUPPLY

<u>YEAR</u>	<u>SATISFACTORY</u>	<u>DOUBTFUL</u>	<u>UNSATISFACTORY</u>
1971	20	0	1
1972	10	1	0
1973	1	0	1
1974	16	0	5
1975	2	0	0
TOTAL	49	1	7
PERCENT	86%	2%	12%

THE RABBIT LAKE TRAILER PARK

At the present time, this water system is supplying water to seventy-nine trailer units and three houses. The estimated population on this system is approximately two hundred and fifty people.

The water is chlorinated by using a sodium hypochlorite solution (5.25 percent available chlorine). The owner maintains a stand-by chlorinator in the event of a mechanical break-down of the operating chlorinator.

Records which have been kept, show that on numerous occasions, the chlorine residuals have been below the required 0.5 mg/l level. In fact during several inspections in the past, it was found that no chlorine was being added to the system. This probably accounts for the large number of adverse bacteriological samples, which have been collected over the years [Table Three (b)]. At no time should the chlorine residual readings be below 0.5 mg/l.

Sewage from the mobile homes is directed by a gravity flow collection system to a holding tank, which is located about 150 feet from the Lake. The sewage is hauled every second day from the twenty-thousand gallon tank to the Kenora Sewage Treatment Plant.

Residents of the trailer park who do not properly insulate or heat their connections from the water system into their mobiles, often bleed their water lines throughout the winter, so that their pipes do not freeze. This has resulted in a great deal of problems in the past as the holding tank fills up and flows over. Due to the location of the tank, this problem has both health and environmental implications.

TABLE FOUR

NORTHWESTERN HEALTH UNIT BACTERIOLOGICAL
RESULTS OF BATHING AREAS

<u>DATE</u>	<u>RABBIT LAKE BEACH</u> <u>SAMPLING STATION NUMBERS</u>								
	1	2	3	4	5	6	7	8	9
June 16	10,10*	8,8	4,0	8,8	0,0	84,84	2,2	2,0	56,56
June 25	154,138	110,110	130,72	300,200	200,100	500,128		500,44	
July 2	66,22	110,38	52,20	36,18	48,10	24,24	60,30	28,4	18,18
July 9	48,16	46,18	32,6	24,10	14,10	104,40	90,38	60,22	90,88
July 15	38,38	62,62	400,300	56,56	20,16	500,400	48,48	14,2	300,12
July 22	70,30	74,24	54,40	48,4	20,4	138,24	50,20	14,14	800,500
Aug. 7	10,10	12,0	10,4	6,2	8,2	108,64	34,10	10,2	108,44
Aug. 11	74,66	20,0	14,2	4,0	10,2	134,4	16,0	0,0	36,4
Aug. 18	260,0	60,0	36,2	36,0	38,8	66,4	82,12	36,4	12,0
Aug. 26	46,6	26,4	40,6	56,0	36,0	114,16	48,6	92,0	18,12
Geometric Mean Values	51,14	39,9	36,10	35,10	19,5	123,33	34,11	20,4	42,16

<u>DATE</u>	<u>GARROW BEACH</u> <u>SAMPLING STATION NUMBERS</u>					
	1	2	3	4	5	6
June 16	22,16	22,2	14,14	2,2	8,8	46,46
June 24	70,48	50,30	40,40	14,14	18,14	76,50
July 2	70,44	42,20	10,0	16,4	12,0	
July 9	76,0	70,46	34,2	30,4	20,0	98,38
July 15	90,54	52,50	142,60	48,48	66,66	180,180
July 22	90,50	6,0	66,6	50,4	32,0	300,0
July 29	24,8	10,10	2,0	22,14	2,2	22,22
Aug. 7	48,32	32,2	20,0	16,0	6,0	50,2
Geometric Mean Values	54,20	27,9	23,5	18,6	18,4	82,18

*The two figures represent the number of total and faecal coliforms respectively per 100 ml. of water (i.e., 4,0 means 4 total coliforms & 0 faecal coliforms per 100 ml. of water).

SURFACE WATER SURVEY

INTRODUCTION

As part of the survey, bacteriological samples were collected from various points along the inhabited shores of Rabbit Lake and from the major drainage patterns in the area. Also chemical samples were collected from five locations on Rabbit Lake and from one location on the creek which drains from Rabbit Lake to the Winnipeg River.

All samples were taken 3 centimeters below the surface of the water. The bacteriological samples were analyzed at the Ministry of Health Laboratory in Kenora and the chemical samples were analyzed in the Ministry of the Environment Laboratory in Thunder Bay. All tests were performed according to "Standard Methods".

Bacteriological sample results collected by Health Unit officials from Rabbit Lake and Garrow Beach during the summer months of 1975, are included to make the survey complete.

DISCUSSION OF BACTERIOLOGICAL RESULTS

The geometric mean values of the bacteriological results (Table Four) collected from Rabbit Lake and Garrow Beaches, illustrates that both of these beaches are well within Ministry of the Environment bacterial criteria for bathing waters. However, these same coliform counts dictate that under no circumstances, should water in the immediate vicinity of these areas be utilized for human consumption, without receiving prior treatment.

TABLE FIVE

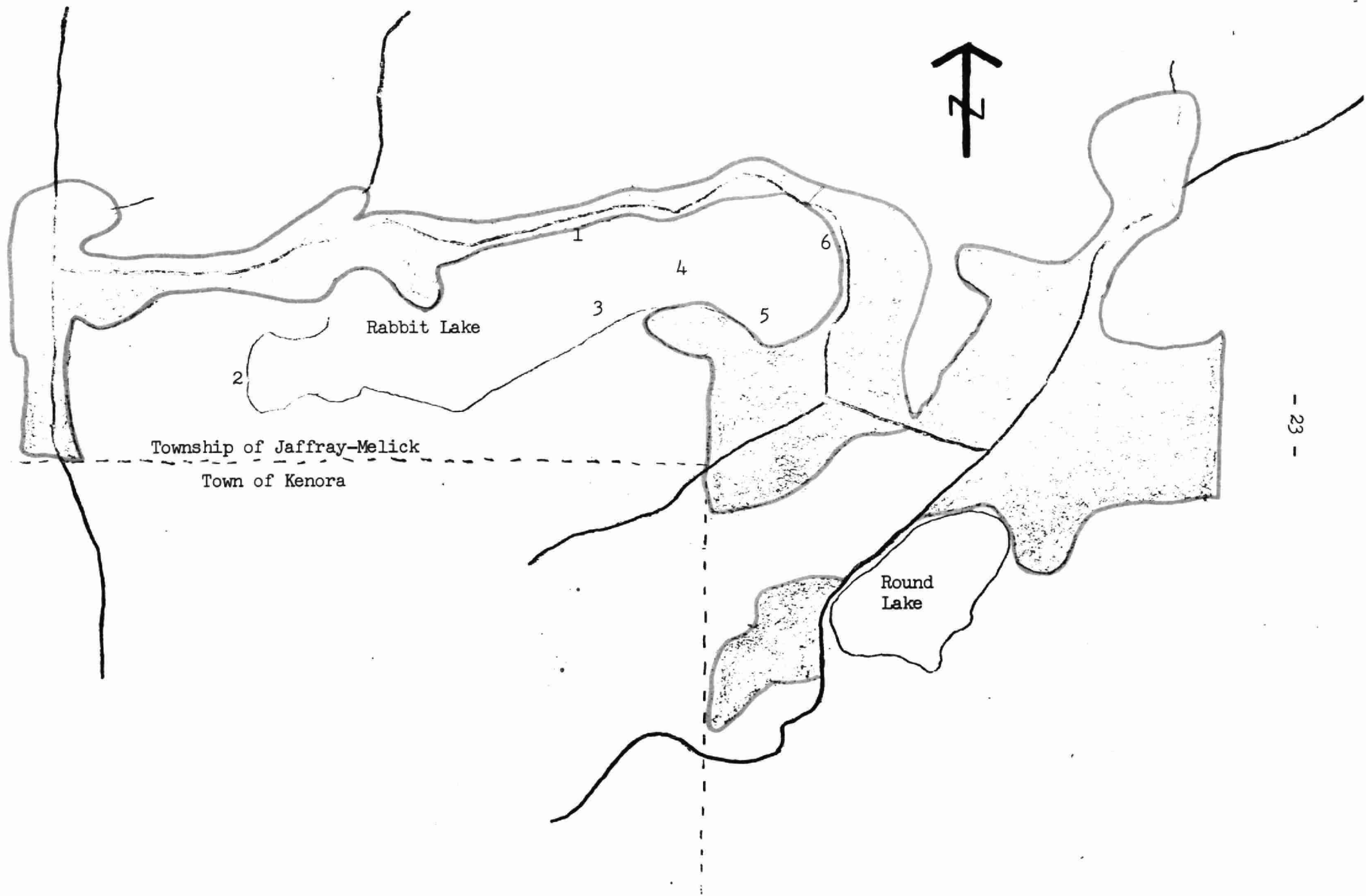
CHEMICAL RESULTS OF SAMPLES COLLECTED
FROM RABBIT LAKE

SAMPLING LOCATION	HARDNESS AS CaCO ₃	ALKALINITY AS CaCO ₃	IRON AS Fe	CHLORIDE AS Cl	PH AT LAB	TOTAL KJELDAHL	PHOSPHORUS AS P TOTAL
1	40	37	.20	17	7.4	.89	.024
2	44	40	.60	17	7.1	1.1	.044
3	40	37	< .05	17	8.0	.99	.015
4	38	37	.05	17	7.6	.75	.016
5	40	35	.05	10	7.7	.79	.019
6	40	35	.05	17	7.8	.79	.015

Note:-

1. All analyses except pH in ppm,
2. Sample locations illustrated on following map.

SURFACE WATER CHEMICAL SAMPLING LOCATIONS



Unfortunately, in the Rabbit Lake beach vicinity, excluding the Rabbit Lake School and the Trailer Park, there are six water systems, which are utilizing lake water. Of these six systems which are servicing ten houses, only one has a chlorinator installed and one other is equipped with a charcoal filter. Unsatisfactory samples were recorded for two of these systems and an additional two had doubtful samples.

The only subdivision close to Garrow beach is Birchwood Crescent. In this section, there are also six systems utilizing lake water. Of the six, two had unsatisfactory coliform counts and of the remaining, four had satisfactory results. Two of the six systems were being treated with chlorine.

In addition to these two areas, samples were collected at several locations, approximately 15 feet off the north shore of Rabbit Lake. Although insufficient samples were collected to give a precise account of the bacteriological activity in this portion of the lake, two general statements can be from the results obtained. They are as follows:

1. The coliform counts are significantly less than in the bathing areas, and
2. Residents utilizing this supply of water for domestic use should be treating this water because of the uncontrollable presence of organisms and viruses that cause diseases in humans such as typhoid fever, paratyphoid fever, polio, dysentery and infectious hepatitis.

Two major drainage patterns which flow into Rabbit Lake were also monitored over the summer. The two ditches involved drain the Birchwood Crescent area and the area to the east of Rabbit Lake, respectively. Both of these ditches showed consistently elevated total and faecal coliform counts. The

levels recorded strongly suggest that sewage is entering the lake through these channels. The results are shown below:

	<u>Birchwood Cres. Drainage Ditch</u>		<u>Rabbit Lake Beach Area Drainage Ditch</u>	
	<u>Total</u>	<u>Faecal</u>	<u>Total</u>	<u>Faecal</u>
Geometric Mean Values	905	259	381	112

DISCUSSION OF CHEMICAL RESULTS

The samples were collected from just below the surface. Therefore, they are representative of only the top layer of the lake where mixing occurs; the epilimnion and not the entire lake. It is anticipated that all of the water intake pipes are situated in this layer.

The sample results are summarized in Table Five and the sample locations are illustrated on the preceding map of the lake.

The most obvious differences between the lake chemical samples and those obtained from the wells are the large variation in iron concentration and the pH. At all sample locations, except number 2, which is the creek draining the lake and would more strongly be affected by the iron rich surface run-off, the iron concentrations are well below the Ministry of the Environment permissible criteria for public water supplies. As outlined previously, the high iron content drainage waters are affected in the lake, not only by dilution but as well are oxidized by dissolved oxygen, which results in the production of insoluble ferrous compounds, which settle to the bottom.

Likewise, the pH of the lake water is more basic than the acidic groundwater. Not only is the pH of the lake influenced by chemical reactions with the atmosphere, but also by reactions with the bottom sediments and the photosynthetic and respiratory activities of the biota.

Of particular interest is the nutrient concentration of the lake as expressed by the total kjeldahl as nitrogen and total phosphorus readings. From the values obtained, it is recommended that Rabbit Lake should be monitored on a routine basis to determine to what extent the natural rate of eutrophication is being increased by the entry of sewage from the Rabbit Lake community.

PROPOSED WATER AND SEWER SERVICES

In September of 1973, Proctor and Redfern, Limited was contracted by the Ministry of the Environment to design a water distribution system and a sewage collection system to connect with the existing Town of Kenora systems, to service what has been referred to in this report as the study area.

For the exact design details and cost estimates, the writer refers any interested parties to the two design reports, which were completed in February of 1975, namely:

1. Ontario Ministry of the Environment, Township of Jaffray-Melick
Design Report - Water Provincial Programme No. 5-0194-73
2. Ontario Ministry of the Environment, Township of Jaffray-Melick
Design Report - Sewerage Provincial Programme No. 1-0332-73

Both of these reports are available at the Township of Jaffray-Melick Municipal Office or at the Ministry of the Environment.

CONCLUSIONS

From the results of the Jaffray-Melick survey, it was evident that the use of private wells for domestic water supplies has met with very limited success. Over 37% of the private water supplies tested were found to be contaminated at the time of sampling. In addition, many more wells have been abandoned previous to the study and over 25% of the residents utilize water pumped from the near-by lake or import water from known safe sources. Another 11% with wells are forced to import

water for part of the year when their water quality is contaminated or their wells run dry. There is no question that seepage from septic tank-tile field systems and privies is entering many of the wells in the area. Even despite this fact, many more of the wells have poor chemical water quality due to the acidity and high iron concentrations.

The two major treated water works systems in the area have been somewhat more successful in the past. However, with both of these systems, the reliability of the treatment process depends heavily on the efficiency and conscientiousness of the operator. Any failure of either of these systems could have serious health implications for a large number of people.

The water quality of Rabbit Lake was found to be relatively good. Nevertheless, sewage was found to be entering the lake by way of the major drainage patterns and directly from several malfunctioning tile fields situated close to the shoreline. For this reason, it is suggested that the water quality be tested routinely to determine the extent this is having on the eutrophication of the lake. Also under no circumstances is the water from Rabbit Lake suitable for drinking unless it is properly treated.

RECOMMENDATIONS

SHORT TERM

1. All residents utilizing water from the lake should provide complete treatment to the water before using it for domestic purposes.
2. All residents utilizing wells should collect bacteriological samples for analyses on a regular basis and provide treatment facilities if they are required.

3. All residents utilizing faulty sewage disposal systems should up-grade their systems so that they are not causing pollution or health problems.

LONG TERM

1. A public water supply distribution system should be extended from the existing Town of Kenora system to furnish the described areas in the Township of Jaffray-Melick with safe potable water
2. A public sewage collection system should be extended from the existing Town of Kenora system to end the pollution of the ground and surface waters.

Prepared by: Wayne Herrick
W. Herrick, B.Sc.
Environmental Officer

WH:dl



Ontario

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APPENDIX 1

Ministry of the
Environment

203 First Street South
Kenora, Ontario
P9N 1C2
Telephone: 468-5578

Date _____

Dear

Re: Bacteriological Examination of Drinking Water

The laboratory bacteriological report on the sample of your drinking water taken during the water quality and waste disposal survey of Jaffray & Melick indicates the following:

Total Coliform

Faecal Coliform

As the enclosed folder shows, the result is above that normally considered safe for drinking water. It should be noted that this is the result of a single sample and therefore additional samples should be taken to verify the results. If upon subsequent testing your drinking water proves to be bacteriologically adverse, we would strongly suggest that you consult the Northwestern Health Unit regarding the installation of some sort of treatment system.

Sample bottles may be obtained at the local Health Laboratory located in the Provincial Building, 808 Robertson Street.

Thank you for your co-operation during our survey.

Yours truly,